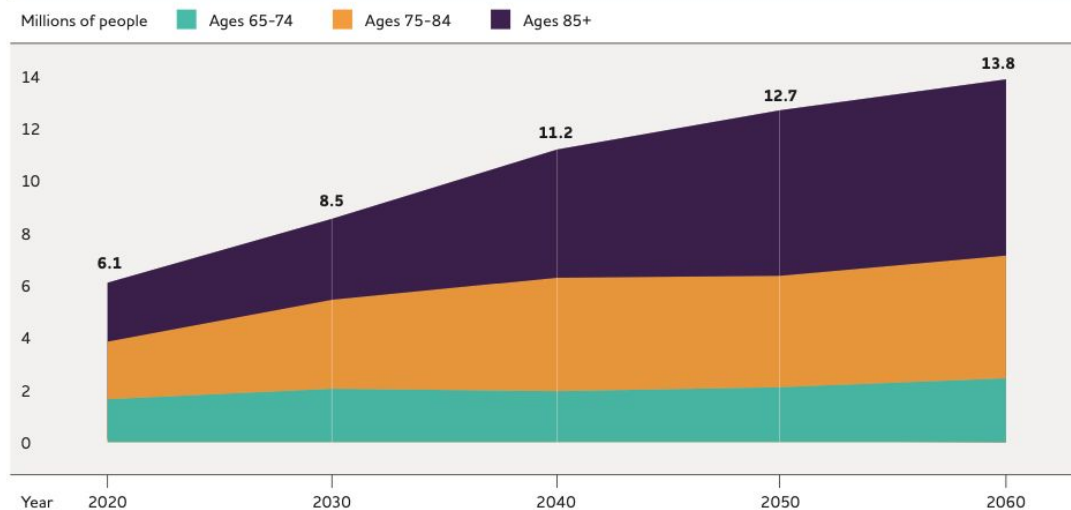

The Genomics of Naturopathic Medicine

— By: Jaime Aguilar —

The Problem

Projected Number of People Age 65 and Older (Total and by Age) in the U.S. Population with Alzheimer's Dementia, 2020 to 2060

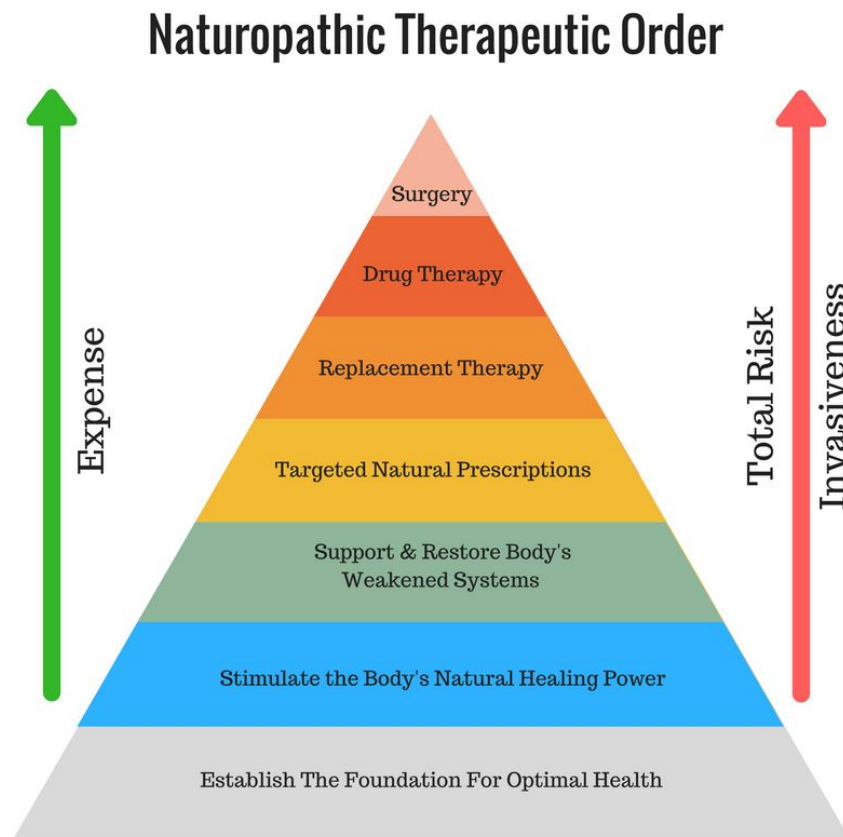


- Declared a Federal Problem
- Today nearly 7 million Americans live with Alzheimer's
- Cost of yearly care is 360 Billion USD
- By 2050 nearly 13 million could be living with Alzheimer's

Why Conventional Medicine Lead to this Problem

- A systemic brief consultation
- Fails to address root cause
- Alzheimer's is a systemic multifaceted issue
- Naturopathic Medicine is the scientific solution

The Full Spectrum Therapeutic Order Found in Naturopathic Medicine



Premise

- Higher inflammatory biomarkers = Higher neuro inflammation = Faster progression of potential Alzheimer's Disease
- Higher oxidative stress biomarkers = Higher neurotoxicity = Faster progression of potential Alzheimer's Disease
- High unhealthy biomarkers are just fuel for disease

Proposal

- How does Naturopathic Medicine and Traditional Chinese Medicine herbs, such as Danggui Shaoyao San and Rhodiola Rosea, affect the gut microbiome and this colonic and overall gene expression, to reduce or prevent the progression of Alzheimer's disease and its pathologies?

Dataset 1

- Hundreds of biomarker measurements over 3 main groups
- DSS: Mice induces with Alzheimer's that receive the herb Danggui Shaoyao San
- M: Mice induced with Alzheimer's that receive no Danggui Shaoyao San
- Con: Control group

Dataset 2

- 20+ biomarker measurements over Braak Stage groups
- Braak Stage 0: Mice with early Alzheimer's
- Braak Stage I-II: Mice with somewhat progressed AD
- Braak Stage III-IV: Mice with later AD
- Braak V-VI: Mice with late AD

Dataset 3

- Gene expression measurements
- Reference gene + Inflammatory Liver markers
- Mice treated with herb *Rhodiola Rosea* or water
- Lower gene expression ratio = Lower inflammatory markers
- $\text{Crp Liver ct} / \text{GADPH Ct Liver}$

Dataset 4

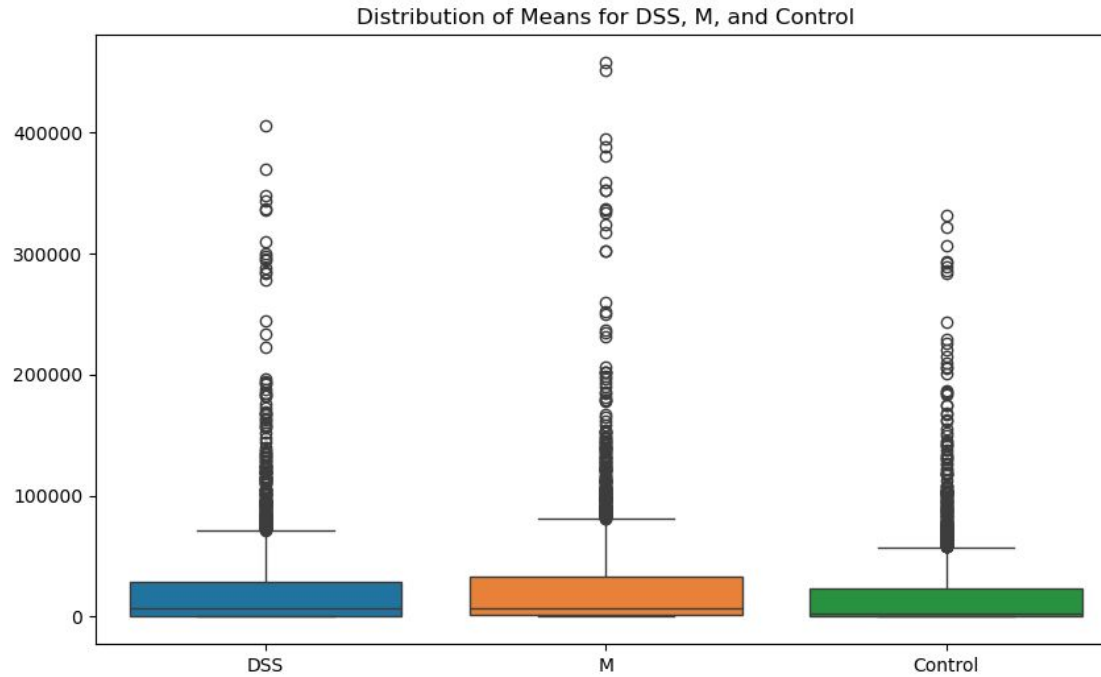
- RNA colonic gene expression measurements of mice
- Many different genes
- Higher values = higher expression

Results

- Dataset 1: *DSS reduces and prevents Alzheimer's pathology.*
- *All of the oxidative stress biomarker averages, and std deviations for the DSS test group are lower than the M group that did not receive DSS even tho both groups are induced with Alzheimer's.*

	mean_DSS	std_DSS	mean_M	std_M
1	3826.833333	4733.886457	5489.978	8955.680670
2	5796.226667	5804.802297	8678.71	8993.934839

Results



Results

- *There is a strong correlation that Danggui Shaoyao San driving lower levels of Alzheimer's disease pathology.*

```
DSS_6      0.001097
DSS_5      0.018316
DSS_4      0.010785
DSS_3      0.024183
DSS_2      0.010662
...
Con_3      0.011731
Con_2      0.019761
Con_1      0.024481
inflammation_biomarkers      NaN
oxidative_stress_biomarkers    1.000000
Name: oxidative_stress_biomarkers, Length: 17, dtype: float64
```

Average for DSS group: 0.0106 Average for M group: 0.0063 Average for CON group: 0.0177 The group with the lowest average is the M group, with an average value of 0.0063.

Results

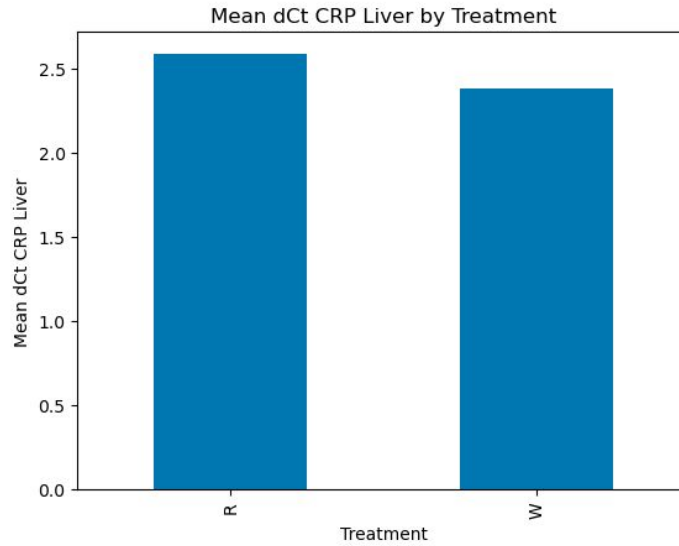
- Dataset 2: *Any level of Alzheimer's is markedly similar to early and later stage progression of biomarkers.*
- *Null hypothesis rejected*

R Group – Pearson Correlation: -0.6267056150840675 , P-value: 0.18301400349578048

W Group – Pearson Correlation: -0.31276776715263405 , P-value: 0.4506831691999088

Results

Dataset 3: *Statistically water seemed more effective than Rhodiola in showing a smaller amount of liver inflammation*



Results

- Dataset 3: *Rhodiola Rosea* is efficacious in preventing AD, as seen in this machine learning algorithm.
- Lower liver inflammation ratio is associated with higher chances mice were treated with *Rhodiola* versus water.

```
Cross-validation accuracy scores: [0.33333333 0.66666667 0.66666667 0.33333333 0.5      ]
Mean cross-validation accuracy: 0.5
Logistic Regression Coefficients: [[-0.05081321]]
Intercept: [-0.28783944]
A lower liver ratio is associated with a higher likelihood of Treatment 'R'
```


Recommendations

The study above proves that DSS is more efficacious in preventing Alzheimer's pathology than Rhodiola Rosea is. It is recommended that supplementation with this herbal concoction over Rhodiola Rosea with the guidance of a Traditional Chinese Medicine Practitioner or Naturopathic Doctor, be given serious thought if Alzheimer's is prevalent in one's family.

Supplement companies could market DSS as an anti-neurodegenerative supplement based on the research of the studies above, and even promote a Danggui Shaoyao San supplement as anti-Alzheimer's to whatever legal limits they are able to based on the regulating bodies of their country.